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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,136	04/21/2004	Hee-hwan Choe	8116-1 (PL0026/US)	5461
22150 7590 05/10/2007 F. CHAU & ASSOCIATES, LLC 130 WOODBURY ROAD WOODBURY, NY 11797			EXAMINER DHINGRA, RAKESH KUMAR	
			ART UNIT 1763	PAPER NUMBER
			MAIL DATE 05/10/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/829,136	CHOE ET AL.	
	Examiner	Art Unit	
	Rakesh K. Dhingra	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 3/9/2007 have been fully considered but they are not persuasive as explained hereunder.

Applicant argues that neither Donohoe nor Aoki disclose or suggest a mixer outputting an unbranched mixed voltage of a main voltage, a bias voltage, and an auxiliary voltage to one of a lower electrode and an upper electrode, as essentially recited in claim 1 and that Donohoe does not disclose or suggest a bias voltage. Applicants also submit that none of the three generators 31, 32, 33 generates a bias voltage and because Donohoe fails to disclose a bias source, Donohoe also does not disclose a bias frequency lower than the main frequency as claimed. Applicants respectfully submit that Aoki does not cure the deficiencies in Donohoe as Aoki is silent regarding bias voltage and any relationship between bias and main frequencies.

Examiner responds that Donohoe teaches a mixer 37 that mixes three signals 34, 35, 36 each having discrete frequencies and power levels and supplies the unbranched mixed signal (would inherently supply voltage) to lower electrode 102 (Figure 4) as per claim 1 limitations. Further, since there are three frequency generators any of these could be designated as main, bias and auxiliary voltage generators depending upon required frequency and output voltage/power levels and as per process limitations. Further, as shown in Figure 7, these three generators can generate different and discrete frequencies, meaning that one of the generator with lower frequency could be designated as bias frequency generator. Additionally use of impedance matching networks with plasma power sources is well known in the art and Aoki reference is cited as an example of the same. Therefore, Donohoe in view of Aoki teach all limitations of claims 1 and 3 and rejection of these claims under 35 USC 103 (a) is maintained as explained below.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Donohoe et al (US Patent No. 6,309,978 B1) in view of Aoki et al (US PG PUB 2003/0049558).

Regarding Claim 1: Donohoe et al teach a plasma chamber 101 (Figure 4) comprising a lower electrode 102 and an upper electrode 103, and used for etching/deposition comprising:

a multi-frequency RF source 114 connected to lower electrode 102 (Column 5, lines 20-38). Donohoe et al further teach that the multi-frequency source 114 (per Figure 6) includes three frequency generators 31, 32, 33 (like main, bias and auxiliary power generators) and which provide discrete (predetermined) frequency and discrete power (predetermined amplitude) levels (Figure 7 and Column 6, lines 14-17).

Donohoe et al also teach that apparatus further includes a mixer 37 which combines the output signals of three frequency generators 31, 32, 33 and provides output signal 30 to the lower electrode 102. Donohoe et al also teach that generators 31, 32, 33 can provide discrete as well as a spectrum of frequencies and power levels (implies voltages also). Further, since the three generators 31, 32, 33 can supply different frequencies, the bias frequency can be lower than the main frequency [Column 6, lines 5-25].

Though Donohoe et al do not teach first, second and third impedance matching circuits connected to the mixer, use of impedance matching circuits for impedance matching between RF source and the plasma is known in the art, as per example given hereunder.

Aoki et al teach a plasma apparatus (Figures 1C, 14A) that includes a plasma reaction container 502 and upper electrode 103 to which RF power is supplied. Aoki et al further teach that apparatus includes three power sources 110A, 110B, 801 (like main, bias and auxiliary power supplies) and three corresponding matching networks 112A, 112B and 802 whose output power of predetermined frequencies and amplitudes is synthesized (mixed) and supplied to upper electrode 103. Aoki et al also teach that separate matching circuits can be placed with each RF power source (paragraphs 0104-0111 and 0533-0537).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use matching networks between the three power sources and the mixer as taught by Aoki et al in the apparatus of Donohoe et al to enable impedance matching between three power sources and the plasma chamber.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh K Dhingra



Parviz Hassanzadeh
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Art Unit 1763